Star's Name.	R.A. h	m	s	N.P.D. °	′	″	
h 1761	22	16	24	16	0	38	Oblong. Requires re-examination.
h 5529	22	28	57	95	6	4	*ϰ Aquarii.* An excessively minute companion strongly suspected.
h 3158	22	53	15	20	8	37	Excessively close. Requires verification. Position 45°.
Sh 358	23	46	20	59	6	20	? If two distinct double stars. If only one, ? its place.
σ 690		49	22		11	40	

Note on a Pair of Differential Equations in the Lunar Theory.

By Prof. Cayley.

The equations

$$\frac{d}{dt}\frac{d\varrho}{dt} - \varrho\left(\frac{dv}{dt}\right)^2 + \frac{1}{\varrho^2} = km^2\varrho\left\{\frac{1}{2} + \frac{3}{2}\cos(2v - 2mt)\right\},$$

$$\frac{d}{dt}\varrho^2\frac{dv}{dt} = jm^2\varrho^2\left\{\frac{3}{2}\sin(2v - 2mt)\right\},$$

taking therein $j = k = 1$ in effect present themselves in the Lunar Theory, and particular integrals in series have been obtained, the development being carried to a great extent; but I give the results only as far as m^4, viz., writing

$$t - mt = \mathrm{D},$$

we have

$$v = t + \left(\frac{11}{8}m^2 + \frac{59}{12}m^3 + \frac{893}{72}m^4\right)\sin 2\,\mathrm{D} + \frac{201}{256}m^4\sin 4\,\mathrm{D},$$

$$1 = 1 + \frac{1}{6}m^2 - \frac{179}{288}m^4 + \left(m + \frac{19}{6}m^3 + \frac{131}{18}m^4\right)\cos 2\,\mathrm{D} + \frac{7}{8}m^4\cos 4\,\mathrm{D},$$

In the Lunar Theory j and k are properly each $= \frac{1}{1+\frac{\mathrm{E}}{m'}}$ (E the mass of the Earth, m' that of the Sun), but they are taken to be $= 1$; the numerical difference is inappreciable; but there would be a considerable theoretical advantage in retaining in the equations the coefficients j, k: in fact, the developments could then be arranged according to the powers of k, that is according to the powers of the disturbing force; whereas, when k is taken $= 1$, we have only a development in powers of m, and since m also presents itself through the coefficient $2 - 2m$ of t in $2v - 2mt$, terms which are really of different orders in regard to the disturbing force, are united together into a single term: in fact, instead of a term of the form $(Ak + Bk^2 + \&c.)\,m^p$, where A, B, are numerical,

we have the term $(A + B + \ldots)\, m^v$, where of course $A + B \ldots$ is given as a single numerical coefficient. There is no equal advantage in retaining the two coefficients k, j, as this only serves to show how a term arises from the central and tangential forces respectively; thus retaining these coefficients, the integrals as far as m^2 are

$$v = t + \left(\tfrac{1}{2} k + \tfrac{7}{8} j\right) m^2 \sin 2\,D,$$

$$\frac{1}{\varrho} = 1 + \tfrac{1}{6} m^2 k + \left(\tfrac{1}{2} k + \tfrac{1}{2} j\right) m^2 \cos 2\,D,$$

agreeing with the former result when $k = j = 1$; but there is, nevertheless, some interest in retaining the two coefficients. I hope to develope the results somewhat further, and to communicate them to the Society.

Observations of Comets from B.C. 611 *to* A.D. 1640, *extracted from the Chinese Annals, translated, with Introductory Remarks, and an Appendix comprising Tables for reducing Chinese Time to European Reckoning, and a Chinese Celestial Atlas.* By John Williams, F.S.A., Assistant-Secretary of the Royal Astronomical Society. London: Printed for the Author, by Strangeways and Walden. 4to, 1871.

The Author was, by a question put to him by Mr. Hind, led to examine Biot's Catalogue of Comets observed in China; and he quickly found that, although very accurate in its details, it was by no means so complete as could be wished, many comets being recorded in the "Encyclopædia" of Ma Twan Lin, and in the great historical work called the "She Ke," which are not noticed by Biot. It therefore occurred to him that a catalogue comprising the whole of the observations of the comets contained in the two Chinese works just referred to, translated from the original, and arranged chronologically, with an explanation of all the particulars connected with them, might be of service to astronomers, particularly to those engaged in cometary researches. The observations thus brought together amount to 373.

The introductory remarks comprise many interesting particulars relating to Chinese astronomy, and also instructions for the use of the chronological tables contained in the appendix, giving the succession of the dynasties and emperors from the earliest period to the present time; and of the other tables for finding the months, or moons, and days. The Appendix includes also a complete Chinese celestial atlas from an original work, so that the names and relative positions of the asterisms and stars can be readily found.

As this work has been privately printed by the Author, it forms no part of the publications of the Society. It can be obtained (at a reduced price to Fellows) by application to Mr. Williams at the rooms of the Society.